CLAIMS

What is claimed:

1. A flow control device, comprising:

a sealing component that can be positioned within a bronchial lumen, the sealing component comprised of two or more overlapping segments that are movable relative to one another such that the segments collectively form a seal that can expand and contract in size to fit within and seal bronchial lumens of various sizes.

2. A device as defined in claim 1, wherein the sealing component permits fluid flow in a first direction and prevents fluid flow in a second direction opposed to the first direction when the sealing component is located within a bronchial lumen.

3. A device as defined in claim 1, wherein the overlapping segments collectively form a conical shape and wherein the diameter of the conical shape can vary as one segment moves with respect to another segment.

4. A device as defined in claim 1, further comprising a retainer frame comprising a core and a first set of one or more deployable arms.

5. A device as defined in claim 4, wherein the deployable arms are laterally biased.

6. A device as defined in claim 4, wherein the two or more overlapping segments of the sealing component are attached to the core.

7. A device as defined in claim 4, wherein the core is formed integrally with the deployable arms.

8. A device as defined in claim 4, wherein the overlapping segments of the sealing component project in a proximal direction and the deployable arms project in a distal direction.

9. A device as defined in claim 4, wherein the retainer frame further comprises a second set of deployable arms.

10. A device as defined in claim 9, wherein the second set of deployable arms are formed integrally with the core.

11. A device as defined in claim 9, wherein the second set of deployable arms project in a proximal direction.

12. A device as defined in claim 9, wherein the second set of deployable arms are laterally biased.

13. A device as defined in claim 9, wherein the two or more overlapping segments of the sealing component are supported by the second set of deployable arms.

14. A device as defined in claim 4, wherein the two or more overlapping segments of the sealing component are supported by the first set of deployable arms to maintain the seal of the bronchial lumen against fluid flow in a first direction.

15. A device as defined in claim 14 wherein the overlapping segments are axially deflectable away from the deployable arms to allow fluid flow in a second direction.

16. A device as defined in claim 4, further comprising one or more sleeves slideably positioned over the retainer frame.

17. A device as defined in claim 16, wherein the one or more sleeves are adapted to slide over the first set of deployable arms to radially collapse the deployable arms.

18. A device as defined in claim 16, wherein the one or more sleeves is adapted to be coupled to an actuation element for pushing or pulling the sleeves.

19. A device as defined in claim 18, wherein the one or more sleeves comprises a receptacle for receiving the actuation element.

20. A device as defined in claim 16, wherein receptacle is adapted to allow removal of the actuation element therefrom.

21. A device as defined in claim 1, wherein each overlapping segment has a radial edge configured to overlap an adjacent overlapping segment, the radial edge being unconnected to the adjacent overlapping segment.

22. A device as defined in claim 1, wherein each overlapping segment has a radial edge configured to overlap an adjacent overlapping segment, the radial edge being connected to the adjacent overlapping segment.

23. A device as defined in claim 1, wherein each of the overlapping segments is connected to another of the overlapping segments by a foldable section.

24. A device as defined in claim 23, wherein the foldable section is less stiff than the overlapping segments.

25. A flow control device, comprising:

a retainer frame comprising a core, a first set of deployable arms projecting from the core, and a second set of deployable arms projecting from the core; and

a sealing component comprising two or more overlapping segments that are movable relative to one another such that the segments collectively form a seal that

can expand and contract in size to fit within and seal bronchial lumens of various sizes.

26. A flow control device as defined in claim 25, wherein said two or more overlapping segments are attached to the core of the retainer frame.

27. A flow control device as defined in claim 25, wherein the two or more overlapping segments of the sealing component are supported by the first set of deployable arms to maintain the seal of the bronchial lumen against fluid flow in a first direction.

28. A flow control device as defined in claim 27, wherein the two or more overlapping segments of the sealing component are axially deflectable away from the first set of deployable arms to allow fluid flow through the bronchial lumen in a second direction.

29. A flow control device as defined in claim 25, further comprising one or more sleeves slideably positioned over the retainer frame.

30. A flow control device as defined in claim 29, wherein the one or more sleeves are adapted for coupling to an actuation element for pushing or pulling the one or more sleeves.

31. A flow control device as defined in claim 29, wherein the one or more sleeves are adapted to slide over the first and second sets of deployable arms to radially collapse the first and second sets of deployable arms.

32. A flow control device as defined in claim 25, wherein the overlapping segments collectively form a conical shape and wherein the diameter of the conical shape is variable by moving one segment with respect to another segment.

33. A flow control device as defined in claim 25, wherein one of the first and second sets of deployable arms is configured to engage a wall of the bronchial lumen to anchor the device therein.

34. A flow control device as defined in claim 25, wherein each overlapping segment has a radial edge configured to overlap an adjacent overlapping segment, the radial edge being unconnected to the adjacent overlapping segment.

35. A flow control device as defined in claim 21, wherein each overlapping segment has a radial edge configured to overlap an adjacent overlapping segment, the radial edge being connected to the adjacent overlapping segment.

36. A flow control device as defined in claim 25, wherein each of the overlapping segments is connected to another of the overlapping segments by a foldable section.

37. A flow control device as defined in claim 36, wherein the foldable section is less stiff than the overlapping segments.

38. A method of regulating fluid flow to and from a region of an individual's lung, comprising:

placing a flow control device in a bronchial passage in communication with the region, the flow control device having a first set of one or more deployable arms in a collapsed configuration; and

radially expanding the first set of one or more deployable arms into engagement with a wall of the bronchial passage to anchor the flow control device therein;

wherein the flow control device has a plurality of overlapping segments that are movable relative to one another and collectively form a seal with a wall of the bronchial lumen that can expand and contract in size.

39. A method as defined in claim 38, wherein the overlapping segments form a seal against fluid flow through the bronchial passage into the region and are movable to allow fluid flow through the bronchial passage out of the region.

40. A method as defined in claim 38, wherein the overlapping segments are supported by the first set of deployable arms.

41. A method as defined in claim 38, further comprising radially expanding a second set of one or more deployable arms into engagement with the wall of the bronchial passage.

42. A method as defined in claim 41, wherein the overlapping segments are supported by the second set of deployable arms.

43. A method as defined in claim 38 further comprising radially collapsing the first set of one or more deployable arms prior to placing the flow control device in the bronchial passage.

44. A method as defined in claim 43, wherein radially collapsing the deployable arms comprises positioning a sleeve over at least a portion of the one or more deployable arms.

45. A method as defined in claim 44, wherein the sleeve is slidably coupled to the flow control device.

46. A method as defined in claims 44, wherein positioning the sleeve comprises moving an actuator element coupled to the sleeve.

47. A method as defined in claim 38, further comprising removing the flow control device from the bronchial passage after radially expanding the first set of one or more deployable arms.

48. A method as defined in claim 47, wherein removing the flow control device comprises radially collapsing the first set of one or more deployable arms.

49. A method as defined in claim 48 wherein radially collapsing the first set of one or more deployable arms comprises positioning a sleeve over at least a portion of the one or more deployable arms.

50. A method as defined in claim 38, wherein the overlapping segments collectively form a conical shape and wherein the diameter of the conical shape can vary as one segment moves with respect to another segment.

51. A method as defined in claim 30, wherein the overlapping segments are interconnected by foldable sections.

52. A flow control device for placement in a body lumen comprising:

a frame comprising a plurality of struts connected to a distal hub, at least a portion of each strut biased outwardly from the distal hub; and

a membrane coupled to the struts thereby forming an umbrella shape, wherein the frame urges the membrane into engagement with a wall of the body lumen to form a seal therewith.

53. A flow control device as claimed in claim 52, further comprising a retention element attached to the frame and configured to engage the wall of the body lumen to anchor the flow control device therein.

54. A flow control device as claimed in claim 53, wherein the retention element comprises one or more retention struts protruding laterally from the frame.

55. A flow control device as claimed in claim 52, wherein the retention element comprises a coil extending from the frame.

56. A flow control device as claimed in 52, wherein the struts are curved.

57. A flow control device as claimed in 52, wherein one or more pleats are formed into the membrane between the struts.

58. A flow control device as claimed in 52, wherein the struts have distal ends coupled to the distal hub and proximal ends connected to a proximal hub, the struts being curved outwardly therebetween.

59. A flow control device as claimed in 58, wherein the proximal hub is axially movable relative to the distal hub to vary the degree of curvature in the struts.

60. A flow control device as claimed in 59, wherein the distal hub is connected to an axial member, the axial member being movable relative to the proximal hub.

61. A flow control device as claimed in 60, wherein axial member comprises a cable.

62. A flow control device as claimed in 60, wherein the axial member comprises a rod.

63. A flow control device as claimed in 62, wherein the proximal hub is threadably coupled to the rod.

64. A flow control device as claimed in 58, wherein the membrane extends over a distal portion of the struts.

65. A flow control device as claimed in 58, further comprising a retention element attached to the proximal hub, the retention element being configured to engage the wall of the body lumen to anchor the flow control device therein.

66. A flow control device as claimed in 65, wherein the retention element comprises a plurality of struts extending outwardly from the proximal hub.

67. A flow control device as claimed in 58, wherein the proximal hub comprises a locking mechanism for locking the proximal hub in place relative to the distal hub.

68. A flow control device as claimed in 52, wherein the struts are radially collapsible so that the flow control device can be inserted in the body lumen.

69. A flow control device as claimed in claim 52, wherein the struts have a stiffness sufficient to tension the membrane when deployed in the body lumen.

70. A flow control device as claimed in claim 52, wherein the struts have a stiffness sufficient to deform the body lumen into a polygonal shape.

71. A flow control device as claimed in claim 52, wherein the membrane is sufficiently flexible to seal with the wall of the body lumen when the membrane is not tensioned by the struts.

72. A flow control device as claimed in claim 71, wherein the membrane has a durometer in the range of 40 Shore A to 100 Shore A.

73. A flow control device as claimed in claim 52, further comprising a delivery device releasably coupled to the frame and configured to maintain the struts in a radially collapsed configuration.